Enclosure

- The EPA's GHG Inventory approach for the oil and gas sector is based on calculations of emissions for individual activities, equipment types and processes. The EPA did not implement a new methodology but rather used new information on emission factors and activity data to improve accuracy for specific activities, equipment types and processes, as identified in the Recalculations Discussion sections in the Petroleum Systems and Natural Gas Systems sections of the GHG Inventory. Sources of new information include peer reviewed external studies and data reported to the EPA from facilities through the GHGRP. As part of the preparation of this year's GHG Inventory, the EPA held a stakeholder workshop on November 19, 2015, and released detailed technical memos for stakeholders to review and provide comments on updates under consideration.

- The EPA has long recognized the importance of open and transparent external review to ensure that the GHG Inventory meets the highest international standards. As a result, the GHG Inventory undergoes an extensive review process each year. For the 2016 GHG Inventory, the EPA solicited broad public engagement through the annual public review phase of the GHG Inventory, which is announced through a Federal Register notice. In addition, the GHG Inventory will be reviewed through the UNFCCC's annual expert review process.[1] As noted above, the EPA conducted a more extensive stakeholder review process for the oil and gas emissions estimates for this year's inventory, including a workshop and detailed memos on updates under consideration. The EPA has concluded that the GHG Inventory review process is consistent with the OMB's Final Information Quality Bulletin for Peer Review[2] and the EPA's Peer Review Handbook.[3]

- Available data support the overall increase in counts of equipment per well, including for pneumatic controllers in petroleum systems. For example, the Oklahoma Independent Petroleum Association 2014 study (OIPA report) referenced in your letter indicates higher, not lower, counts of pneumatic controllers per well than the GHGRP data set which was used to update the GHG Inventory.[4] The OIPA report (which surveyed 205 wells in Oklahoma) found an average of 3.6 controllers per well, while the GHG Inventory update using the much larger GHGRP data set (nearly 500,000 reported wells in 2014 from across the U.S.) found less than two on average. For more information, please see the EPA's 2015 memo which includes information on the OIPA report: https://www3.epa.gov/climatechange/pdfs/NG-Petro-Inv-Improvement-Pneumatic-Controllers-4-10-2015.pdf. Additionally, the EPA recognizes that the population of pneumatic controllers and other equipment per well varies from site to site. The national GHG Inventory uses total national estimates of the counts of equipment per well to calculate emissions, developed using the observed average counts of equipment per well in the GHGRP.

- As noted in your letter, making use of research studies and data sets from the GHGRP, which focus on a subset of sources and activities, requires the EPA to extrapolate results to the country as a whole. As documented in the GHG Inventory, the EPA assessed this issue by disaggregating GHGRP reporter data by size and found average equipment counts (on a per well basis) in the

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[1] http://unfccc.int/national_reports/annex_i_ghg_inventories/inventory_review_reports/items/6048.php
[2] https://www.whitehouse.gov/sites/default/files/omb/memoranda/fy2005/m05-03.pdf
[3] https://www.epa.gov/osa/peer-review-handbook-4th-edition-2015
[4] http://www.oipa.com/page_images/1418911081.pdf

smaller size categories were not lower than that of the overall GHGRP population. The EPA will continue to assess this issue through review of information from all production companies received as part of the Information Collection Request, which will also be of critical use in order to address emissions from existing sources. For more information, please see https://www3.epa.gov/airquality/oilandgas/methane.html.

- In the process of developing the annual GHG Inventory, the EPA engages with NOAA and others in the atmospheric observation research community. Regarding the *Science* study referenced in your letter, information on trends in total global methane is of great interest to the EPA, but given the global scale of the study, coarseness of the results, and limited attribution, the conclusions cannot be applied to the application of GHG Inventory methodologies for estimates of methane emissions from the U.S. oil and gas sector, which represent a fraction of the global total of anthropogenic and non-anthropogenic emissions assessed by the study. Many recent U.S.-based studies, including those by NOAA, confirm that U.S. oil and gas systems emit large quantities of methane.

- The data source for the GHG Inventory update for gathering and boosting stations included two peer reviewed research studies which collected emissions measurements from over 100 stations, and activity data information from over 700 stations. The studies were funded by EDF, Access Midstream, Anadarko Petroleum Corporation, Hess Corporation, Southwestern Energy and Williams Corporation. The study authors included researchers from Colorado State University, Fort Lewis College, Carnegie Mellon University, and Aerodyne Research, Inc. The EPA consulted extensively with technical experts both externally and within the EPA, including with the Office of Research and Development, on the updates that were made in this year's GHG Inventory.